

THE

BUSINESS REVIEW

FEDERAL RESERVE BANK OF PHILADELPHIA



PENNSYLVANIA PETROLEUM: A SKETCH IN OIL

*Bradford stands for oil.
The city is charming and prosperous.
It sits on top of an old oil field
that produces most of that good
Pennsylvania Grade crude oil
which commands premium prices for
its superior lubricating qualities.
It sells all over the world.
The Bradford oil field is remarkable,
it is the oldest but surest producer
among the country's six score fields.
It is small but rich, tried and true
and it has its second wind.
It is up in McKean County which has
more murmuring pumps than bellowing cows.
McKean County "oil farms" are valuable
for what is below the meadows.
The pumps keep on pumping and
the oil keeps on flowing.*

CURRENT TRENDS

*Business is operating under forced draft
The pressure is breaking out in
higher prices, gray markets, longer hours,
more lending, poor maintenance, frayed nerves.*

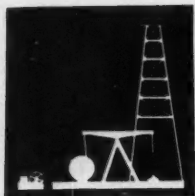
THE
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REVIEW

THE NEW YORK PUBLIC LIBRARY
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PENNSYLVANIA PETROLEUM: A SKETCH IN OIL



In the beginning there was no Pennsylvania. That was in the very beginning when "the earth was without form and void; and darkness was upon the face of the deep." That was a very long time ago—very.

Much, much later—only about 285 million years ago—what is now Pennsylvania began to take on shape. That was when Appalachia began to emerge from the sea. Alternate emergence and subsidence took place; at times land was on top and at times water was on top—a seemingly ageless struggle. All this took place during the Paleozoic era, according to the geologists' calendar—long before William Penn or even Columbus.

Eventually, the land mass now known as Pennsylvania stayed on top and pushed the marine invasion eastward to the 74th meridian cutting through Manhattan and Sandy Hook. But the waters left their mark. Marine life, decomposed through the ages, seasoned by eons of ooze, became embedded in layer upon layer of sedimentation and somehow or other coal was formed and oil and gas. Eastern Pennsylvania got the hard coal; western Pennsylvania got the soft coal, the oil and gas. That is how it all happened, but it took ages upon ages of time. True, there are some missing links in the story of how the oil was formed—but rest assured it is here.

The oil deposits cut diagonally across western Pennsylvania from northeast to southwest. (See orientation insert map of the Bradford pool.) An outline of the Appalachian oil deposits looks like a huge whale with its elongated nose sniffing southwestern New York, its tail lashing eastern Kentucky, and its dorsal fin (twisted in reverse—no doubt due to a gigantic struggle to get back into the ocean) sticking way up in Ohio almost to Cleveland. The mouth is down in West Virginia. This is a prehistoric whale; who knows, prehistoric whales may have had dorsal fins and low-slung mouths.

Whales used to supply our forefathers with spermaceti for candle light, and just about 100 years ago whale oil got so scarce that its price shot up to \$2 a gallon and

higher. Thereupon a new form of artificial illumination was sought. It was found in underground oil.

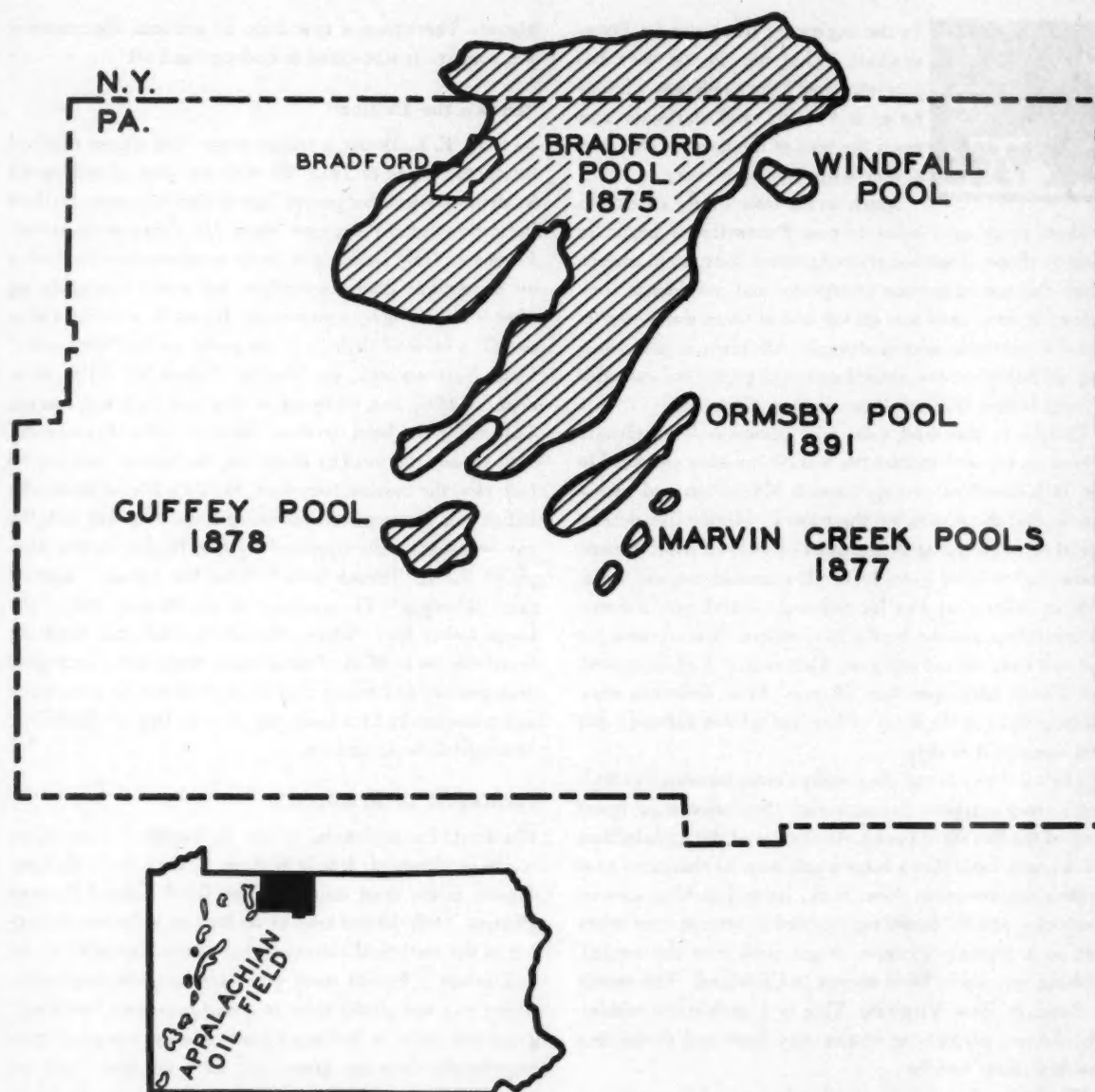
"Drake the Driller"

In 1858, E. L. Drake, a venturesome New Haven railroad conductor, came to Titusville with the idea of seeking oil by drilling—as other people then drilled for water. Surface indications of oil seepages along Oil Creek were known for years. Only Drake, who knew no more about Devonian oil formations than his scoffers, was crazy enough to go after it by setting up a power rig. It took him almost a year to talk a crew of drillers to get going on his "cock-eyed" idea. Sure enough, on Sunday, August 28, 1859, at a depth of 69½ feet, oil began to flow and the boom was on. Volumes have been written about it—the skyrocketing land values, the security flotations, the hastily built barrel factories, the cursing teamsters, the high life of those who struck oil, the impoverishment of those who did not, the gay boating parties operated by Ben Hogen on the Allegheny River, "French Kate," "Coal Oil Johnny," and all that. Whoopee! The gushing oil, the flowing liquor, the boom towns like Pithole, Shamburg, Babylon—and the inevitable bust. Most of these boom towns have long since disappeared, and where they once stood the meadow larks and night hawks have again taken over. But not Bradford; Bradford lives on and on.

Coming in to Bradford

Bradford, Pennsylvania, is not in Bradford County, as might be supposed; it is in McKean County. Now, McKean County is the most unique in the Third Federal Reserve District. Only 16 per cent of its land is in farms, according to the statistical almanacs, but that is exclusive of the "oil farms." Unlike most other farms in Pennsylvania, where you see placid cows in green meadows "cudding" grass into milk, in McKean County you see pumping jacks majestically bowing green oil into its first sight of twentieth century daylight. McKean County has far more murmuring pumps than bellowing cows. The pumps are not only in the meadows but also on the hillsides, on the

**McKEAN COUNTY — WHERE MOST PENNSYLVANIA
OIL COMES FROM**



hilltops, in the orchards, on the lawns—in fact, everywhere except on the well-kept greens of the Pennhills Golf Club or Main Street, Bradford. We did not see any in the middle of first-class highways, but we did see some on the shoulders. Elsewhere in Pennsylvania, good farmers measure the productivity of their land at so many bushels of corn an acre; in McKean County, ordinary farming yields 3,500 barrels of oil an acre, good farming—7,500 to 10,000 barrels.

Bradford

Bradford, as the accompanying map shows, is just on the edge of the Bradford pool, which is an area of about 85,000 acres. It currently produces about 75 per cent of Pennsylvania's petroleum. The pool cuts across the border into New York state, but about 85 per cent of the total yield comes out of the Pennsylvania side. This pool, together with the small satellite pools shown on the map, produced 10 million barrels (a barrel = 42 gallons) last year. This is only a "drop in the bucket" compared with the big mid-continent field in Texas and Oklahoma or the California field; in fact, Bradford produces less than 1 per cent of the country's annual petroleum—but it is high-quality oil, as will be explained. The scalloped paper napkins in one of the city's leading hotels informs the visitor that Bradford is "The High Grade Oil Metropolis of the World." The city has just about everything that goes with a good metropolis—culture, industry, and cleanliness. Its 20,000 citizens have good schools, a Carnegie library, and far more churches than saloons. The local industrial plants make oil-well equipment, cardboard containers, cigarette lighters, and face bricks. Moreover, there are three banks, an airport, three railroads, and, of course, oil plants. The woodsy fragrance of the surrounding hillsides permeates the city. Curiously, as you walk down its clean main street, you do not smell oil; you may think you do, but it is your imagination stimulated by the frequent displays of oil-well supplies in shop windows. The people—whether company president, cigar store clerk, librarian, well driller, or banker—are the friendliest and most hospitable you would want to meet. Fully three-quarters of the people make their living, directly or indirectly, from oil in the Bradford pool.

Around Bradford

About three generations ago, the people in Bradford and throughout the county of McKean made their living, to

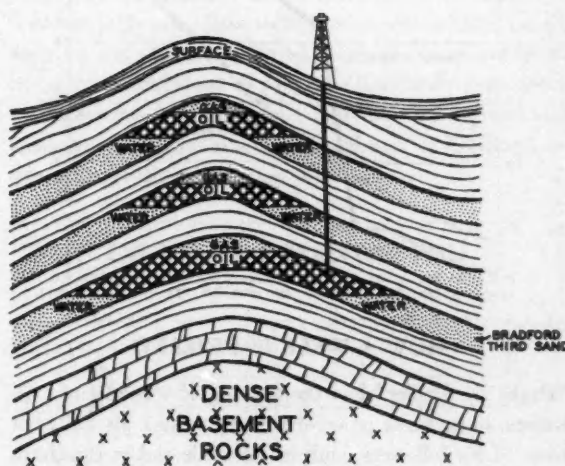
a large extent, by logging the heavily forested hillsides of the county. Even after the oil boom was in full bloom down on Oil Creek, scarcely anyone suspected that McKean's greatest resources were 1,600 feet below the wooded hillsides.

The Bradford oil boom began just about a dozen years after Drake uncorked the Titusville boom. It was all begun by Job Moses in 1871, when he drilled to the unprecedented depth of 1,110 feet and struck the Bradford Third Sand. Of course, he did not know what he had struck—all he was interested in was oil, and he had it.

Below Bradford

Moses was fortunate enough to strike the Bradford Third Sand just outside the present city limits. His well happened to hit a spot, as indicated on the somewhat over-simplified sketch labeled "Where Oil Hibernates." A layer of rock

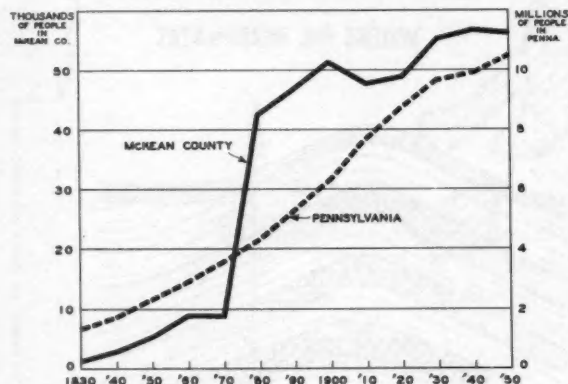
WHERE OIL HIBERNATES



containing the oil is called an "oil sand" in the geologists' language. It is really sand, but so tightly compressed under terrific pressure of time and rocks that we ordinary people would just call it rock. Under the microscope it looks like a sponge, highly porous, with oil diffused throughout the pores. The Bradford Third Sand is somewhat like a deeply buried layer of multiple layer cake baked by a slightly tipsy geological baker whose cake, with the lower layers separated by oil filling, became warped with time. Usually the oil, as well as the gas which is

frequently present with it, lies buried under tremendous pressure trapped between impervious layers of rock immediately above and below the oil sand. Hence, when a well punctures this oil bearing sand, the oil usually rises to the surface under the propelling power of the bottom-hole pressure. The initial flow of the well depends, among other things, upon the amount of pressure released when the first well penetrates a new pool as well as the amount of oil in the sand. Job Moses' well started flowing at the comparatively modest rate of 10 barrels a day. Very shortly thereafter some 150-barrel wells were uncorked, which in turn uncorked a boom in Bradford like that in Titusville just before the Civil War. The population curve of McKean County (shown in the accompanying diagram) tells when this happened in Bradford.

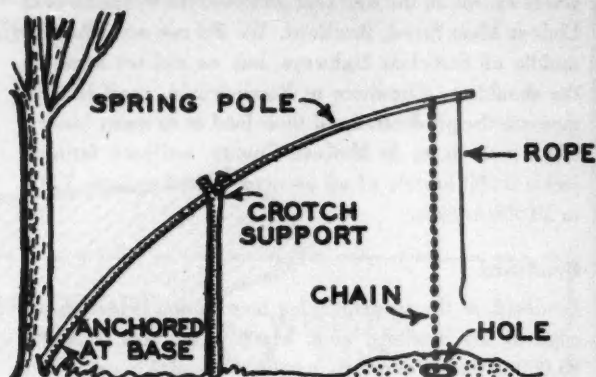
HOW MCKEAN COUNTY GREW



HOW A WELL IS DRILLED

"Drake the Driller" had the backing of a couple of capitalists, so he had a power-driven rig to sink his well; but some of his followers, both in Titusville and in Bradford, lacking capital, "kicked down" their wells. Kicking down a well required a home-made apparatus of the type illustrated, in which the cutting bit or chisel was supported with a rope attached to a spring pole; two men, each with a foot in the stirrups attached to the rope, applied their strength and weight in unison to drop the bit to the surface of the rock, whereupon the bit was raised by the spring pole. Slowly the rock was powdered and the well inched down—the perspiration and the avoirdupois required are obvious. Such efforts sometimes paid off; sometimes not.

RIG FOR KICKING DOWN A WELL



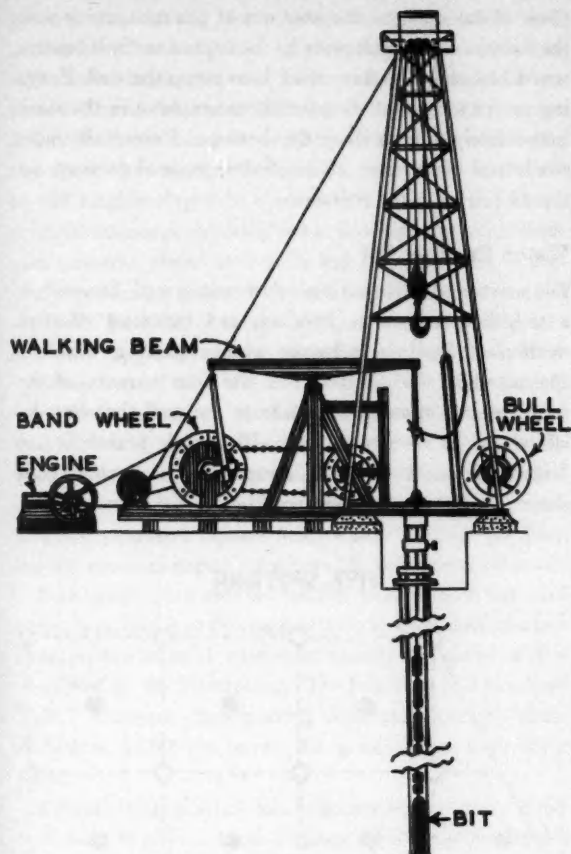
A modern drilling rig, as illustrated on the next page is essentially the same in principle, except that mechanical power is applied. By means of a hand wheel, the engine causes the huge walking beam to rock up and down, which in turn raises and drops the string of tools, at the very bottom of which is a fish-tailed bit which cuts down through alternate layers of rock. A crew of two men attend the machinery, bail out the water, and sink steel casings to seal off infiltrating water, etc. A shift of work is called a "tour" and after about thirty days of this, the Bradford Third Sand is reached.

The Log

The log of a well drilled near Kane, just this year, reads somewhat as follows:

Feet	Formation
0	Clay and shale
62	Sand shells
110	Slate
150	Sand shells (water)
447	Slate
497	Red rock
545	Slate and shells
885	Pink rock
1,215	Red rock
1,315	Slate and lime shells
1,325	Slate
1,550	Sand (odor of oil)
1,915	Sand shells
1,936	Sand (Cooper)—gas
1,989	Slate and sand shells
2,025	Bottom

A MODERN CABLE DRILLING RIG



Whether gas or oil or nothing is struck, the log is always somewhat along this pattern. Sometimes oil is struck, but not enough to justify the cost of drilling. Such a well is unofficially and unaffectionately called a "stinker."

The Cost

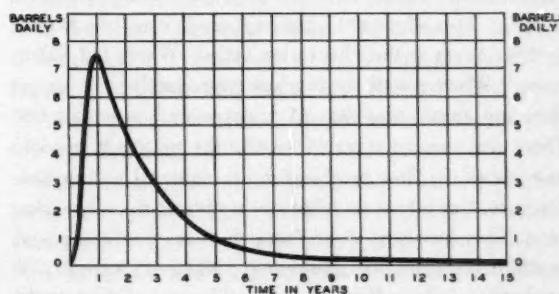
Drilling a well is not exactly a small financial venture. At present-day costs of labor and materials, it runs about \$5,000 on the average to drill a well in the Bradford area. Recently, an experimental well was pushed down to 8,000 feet, which required about two years and \$90,000. Last year, Bradford people drilled almost 2,000 wells. Half of them yielded oil; 11 per cent, gas; slightly over one-third were service wells, that is, wells drilled for flooding purposes, explained later; and only six were "wild cat" wells, that is, wells drilled where there was little probability

of striking oil but always a chance. Less than 3 per cent were dry holes—"strike-outs." Average field price of oil recovered in 1949 was \$3.57 a barrel, but do not start figuring yet whether you should invest—there are some other pertinent facts.

How Long a Well Flows

Bradford wells are unique in that while they do not flow heavy, they flow long. The life line of a typical Bradford well is shown in the sketch. Daily output rises quickly to a peak of about seven to eight barrels a day within the first year of life, and then recedes rather sharply during the ensuing three or four years and continues to decline at an ever-diminishing rate, but apparently never reaching zero. Of course, once in a great while a well hits zero without warning, but that experience is very rare in Bradford. There is a point of diminishing returns that may set in before or after the fifteenth year. However, in Bradford, the point of diminishing returns—that is, the point where the cost of pumping and otherwise nursing a well along becomes greater than the value of the oil recovered is surprisingly low. Most wells produce about half a barrel daily—a mere trickle to the oil people in Texas and Oklahoma, but a livelihood to people in Bradford. True, there are exceptions. For example, a 1,000-barrel-a-day well was unleashed on Music Mountain, southwest of Bradford, as late as 1937—the first gusher in 40 years.

LIFE LINE OF A BRADFORD WELL



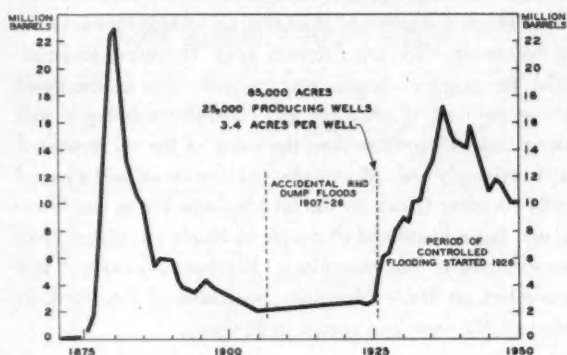
THE YEARS HAVE BEEN KIND TO BRADFORD

The Pitholes and Shamburgs had their day, but Bradford lives on and on. The region is not a paradise of millionaires, but you would be surprised if you could take a peek into the strong boxes of the local banks. There is

still more wealth in the "oil banks" protected by 1,800 feet of rock than in the commercial banks protected by vault steel.

The history of the Bradford Third Sand, as shown in the diagram, is unique in another respect. Production quickly rose to a peak during the half-dozen years following 1875, which was accompanied by a rise in the population of McKean County from a mere 9,000 in 1870 to almost 43,000 in 1880. Shortly thereafter the apparently inevitable decline set in, and from Teddy Roosevelt through Cal Coolidge the region was in the doldrums. Again this is reflected in the population, because up there the people live on oil.

OIL OUT OF BRADFORD



Drilling, Shooting, and Pumping

Nevertheless, about 1905 or 1906 something began to happen. To understand what happened, it will be helpful to refer again to the illustration called "Where Oil Hibernates." When a well approaches unproductive old age, it does not mean that the oil underground is exhausted. There are various ways of teasing the oil sands to yield more than the flow produced by the natural bottom-hole pressure. One way is to drill more wells into the oil-bearing sand. This has been done from the very beginning and is still being done. On January 1, 1950 there were 83,700 producing wells in Pennsylvania, with most of them in the Bradford district.

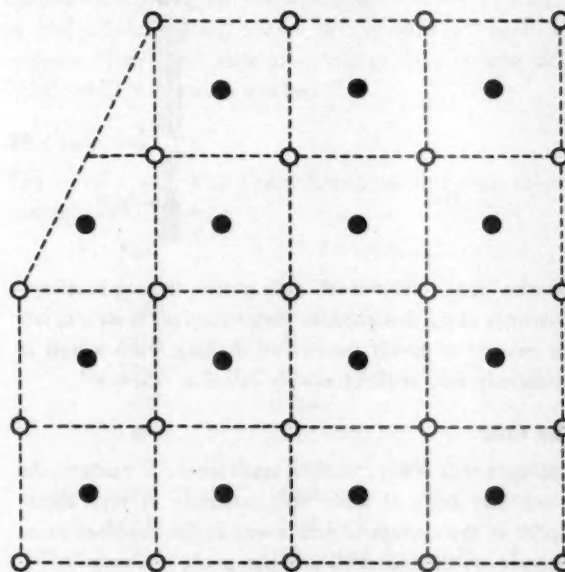
Another way to rejuvenate an old well is to "shoot it," and that is an old story, too. An increase in the yield of beef cannot be obtained by shooting a steer, but frequently the yield of oil can be increased by shooting a well, which is done by placing a charge of nitroglycerin into the bot-

tom of a well and igniting the charge. The explosion is likely to cause a flow of oil from hitherto untapped sections of the oil sand that was out of communication with the bottom of the well prior to the explosion. Still another way to increase the flow of oil is to pump the well. Pumping serves to extract the oil that accumulates in the sands immediately surrounding the bottom of the well under conditions where there is insufficient natural pressure for the oil to rise to the surface.

Water Pushing Oil

The most productive way to rejuvenate a well, however, is a technique known as flooding, and the most effective method of flooding is known as five-spotting, which is illustrated in the diagram. At the four corners of the compass and about 200 feet from the well that has declined to, let us say, a mere 10 barrels a month, are drilled four additional wells down into the oil sand. Then water is injected into these newly drilled service wells for

FIVE-SPOTTING



● OIL WELLS
○ WATER INTAKE WELLS

the purpose of pushing the oil, diffused throughout the sand, toward the bottom of the oil well. Curiously, this method was discovered by accident.

About 50 years ago, it was noticed that some wells, long since abandoned, began flowing again and upon investigation it was found that the rejuvenation was caused by a head of water in a nearby well where water had accumulated after the steel casing, which had been installed earlier to seal off natural underground water, had rusted permitting the nearby well to fill up with water and the hydrostatic pressure of the water-head forced oil up the neighboring well. Prior to 1921 there was a Pennsylvania statute prohibiting water flooding. As a conservation measure, abandoned wells had to be plugged to prevent any foreign matter from entering and destroying the oil sand. In 1921 when the utility of water flooding was generally appreciated, the practice was legalized. Five-spotting, named after the five spot on the gambler's dice (no other connection) is now the practice throughout the Bradford field and elsewhere. Five-spotters no longer depend solely upon the weight of the water head; they inject water into the intake wells under pressure up to as much as 1,500 pounds a square inch, which is about the limit lest the pressure actually fracture the face of the oil sands.

Five-spotting not only revives the decadent well but, curiously, it revives it so thoroughly that the well takes on a new lease on life so as to reproduce exactly the curve of flow described by the illustration, "The Life Line of a Bradford Well." However, five-spotting costs real money—about \$3,500 to \$4,000 an acre. All good things have their price.

Five-spotting practice has rejuvenated the entire Bradford field, as shown in the diagram. Note how production rose from an annual level of about 3 million barrels a year in 1925 to a peak of about 18 million barrels a year in 1937. Ordinary methods extract approximately one-third of the original petroleum stored in an oil sand, and five-spotting succeeds in extracting another third; the final third remains uncaptured by present known methods of recovery.

THE BRADFORD OIL FARMS

The Bradford Third Sand is, in many respects, the country's most remarkable oil field. It is not the biggest, but it is the oldest—it has been flowing oil continuously since 1871. Some individual wells have been flowing for a half-century. The January 26, 1950, "Review and Forecast Number" of the *Oil and Gas Journal* lists under the title "Major Fields Versus Total United States Reserves and Production" about two and a half pages of statistics which

ordinarily would interest no one but an oil man. Mere casual scrutiny of these numbers, however, reveals the significant facts that only five of the country's 134 oil fields have thus far produced more oil than Bradford—the East Texas field, the Oklahoma City field, and three fields in California, namely, Midway-Sunset, Long Beach, and Santa Fe Springs. Even on the basis of total oil produced in 1949, Bradford was by no means near the bottom of the list; only twenty-three of the country's fields produced more oil last year than Bradford.

Another remarkable feature about the Bradford field is that no matter where you drill within the defined limits of the field, you are almost sure to get oil. Last year, one of the leading companies in the area drilled 218 holes and 210 of them yielded oil. What a batting average! Sinking an oil well is almost as sure to yield oil in Bradford as planting a kernel of corn will yield a couple of ears on the typical Pennsylvania farm. You see it is by no means fanciful to refer to the Bradford field as "oil farming."

Four Dollars a Barrel

Price of crude is about the only risk a Bradford producer encounters. He can be almost sure of striking oil; he knows what it costs to drill, to flood, and to sell but he does not know what his oil will sell for when his harvesting time arrives—again like farming. The Bradford oil field is remarkable in still another way; it yields a superior grade of oil.

The current Bradford-Allegheny price of Pennsylvania grade crude oil is \$4 a barrel. That is in contrast with the current price of \$2.50 a barrel for Mid-Continent crude from the Texas-Oklahoma region. The difference in price is due primarily to two reasons: quality and scarcity. With regard to scarcity, take Texas as a contrast. Last year, Texas produced 45 barrels of crude for every barrel produced in Bradford.

Pennsylvania grade crude is superior to other types, because of its paraffin base. Unlike other oils, Pennsylvania crude upon refinement yields both a larger percentage of lubricating oils and a higher grade lubricant. Refineries distilling Pennsylvania crude extract an average of 25 barrels of lubricants out of every 100 barrels of crude processed, in contrast with only 3 out of 100 for the country's refineries generally. Furthermore, lubricants derived from Pennsylvania crude are superior to others with respect to viscosity, volatility, carbon deposit, and other engineering tests applied to lubricants.

The price of Bradford-Allegheny grade crude oil, like that of any other commodity, changes from time to time in response to changes in both supply and demand. Within the past decade it has sold as low as \$2 a barrel or slightly under, and as high as \$5 a barrel—the latter occurred during the 1947-1948 period of peak demand.

Refining

When Bradford oil is brought to the surface it heads immediately for the refinery. It may go to any one of the two dozen refineries in the Appalachian region—from Olean in Cattaraugus County, New York, to Pittsburgh on the south-east, or it may go still further South and West, or it may flow by pipe line to the big refineries at Bayonne, New Jersey. At the refinery the crude is cooked up into various end-products, such as gasoline, fuel oil, lubricants, kerosene, wax and other products. Incidentally, the paraffin base explains why most of the country's candles are made out of Pennsylvania crude. Gasoline obtained from Pennsylvania crude by old-fashioned methods of refining was somewhat inferior in quality, but with modern cracking stills, Bradford gasoline competes with the best. The gasoline marketing area is roughly a radius of 150 to 200 miles from the Bradford field. Bradford lubricants, however, go all over the world.

Pennsylvania crude oil, though an insignificant proportion of the total production of the United States, nevertheless accounts for about 23 per cent of the country's total motor oil. Much of this is sold through jobbers and wholesalers who had rough going during World War II. In need of the highest quality lubricants, the armed forces at that time bought a substantial supply of Pennsylvania lubricants, so that the amount available for domestic civilian consumption was rather seriously curtailed, with the result that jobbers and wholesalers could ill afford to maintain sales outlets without turning to other lubricants. Consequently, several years after the war, when military demands diminished, the Bradford oil people had to exert considerable effort to convince distributors that ample supplies of Pennsylvania lubricants were again available.

Oil Banking

Contrary to what you might suppose, there is very little local oil banking in Bradford, that is, local banks are seldom called upon to finance the production or refining of oil. True, the local banks occasionally make loans on oil warehouse receipts but the banks could not exist if

that were their only business. There are a number of large companies operating in the region and these companies, for the most part, have the financial resources to carry on. Oil, like so many other things, has become big business. It takes money to engage in exploration with its aerial photography, seismographic testing, core drilling, sand analysis, etc., to find out the nature and composition of the various layers of rock, one or two miles down. It takes money to drill, as already indicated. Five-spotting costs money with its additional well drilling and auxiliary installations like air compressors, water supply, storage tanks, feeder lines, pumping stations, oil storage facilities, and pumping jacks. It takes money to operate a refinery, which is a veritable maze of pipes, tanks, valves, pumps, stills, fractionating towers, condensers, coolers, filter presses, percolators, etc. When operated by the engineers, a refinery somehow or other produces the right end-products.

It takes money to build pipe lines and pumping stations to get the oil from the top of the oil well to the refineries, and it takes money for trucks, bulk distributing stations, retail stations, and all of the rest of the paraphernalia of distribution. Add all these things together and before you know it you will have an investment running over \$100 million for just a small company like those operating in the Bradford field, not to mention some of the petroliferous giants that operate in the bigger fields to the South and to the West.

Is the Bradford Field about Played Out?

Is the Bradford field played out? You might get that impression by innuendo if you talk to one of the "Big Inch" boys, but don't let them kid you; Bradford is by no means near the end of its rope. Motoring through the Bradford field or walking through a refinery or sitting in the conference room of the board of directors, you see no evidence whatsoever like dismantling machinery for sale to the second-hand market or closing down stills or taking down maps and pictures from the walls preparatory to going out of business in anticipation of oil wells drying up.

You say, what about reserves? Well, here is the story in brief. In the 79 years that the Bradford field has been operating, it has produced over 500 million barrels of crude, and it is conservatively estimated that there is another 600 million barrels in the ground waiting to see daylight. These figures are estimated by competent people and they are estimated on the basis of the current state of

the arts. However, technology is always changing, so it is reasonable to suppose that new methods of extraction will be developed.

All the leading companies have laboratories, in which you see some of the queerest things. In one corner are piles of little bags that look like money bags; but unlike the labels on similar bags in banks, which say so many nickels or dimes, the labels on these bags say "sample so-and-so" taken from a depth of such-and-such from well number so-and-so at such-and-such a place by so-and-so on such-and-such date. To the banker it looks like just plain dirt. On another counter in the laboratory you see a contraption of test tubes, beakers, stoppers, and flasks, which may be an experiment with a new wetting agent. On a shelf you see a model of a core sample and of course you see people making recordings on columnar tablets and developing abstruse formulae. On shelves you see forbidding tomes—the thick volumes bear titles like "Stratigraphy," or "Paleontology," and the skinnier monographs are likely to bear titles like "Subsurface Projection of Cambro-Ordovician Sediments in the Pennsylvania-New York Region, and Relation to Oil and Gas Possibilities."

Going after oil is very much like going fishing. This analogy is developed, delightfully, by G. R. Hopkins of the National Security Resources Board in an article appearing in the June 1950 issue of the *Journal of Petroleum Technology*, and we quote:

In many respects the development of petroleum production has followed the history of fishing. Our pioneer settlers soon found out, if they already did not know it, that the big fish, like whale, blackfish, and swordfish were to be found at or near the surface.

At first they were abundant and oftentimes could be caught from the shore. This ease of capture and the need for food brought about a rapid depletion. As the demand increased, more and more energy had to be given to catching the smaller fish at 50 to 100 feet in depth. Equipment was improved and more men became engaged. The present general situation is that the American fishermen go farther and farther to catch less and less. The trend is toward decision as to fishing in distant fields, catching the "freaks" at great depth, or having fish farms.

The United States has not run out of large oil fields. There is still room for another stratigraphic "whale"—like East Texas. Perhaps the reef development in Scurry County could be classed that. Some fields of the cod, haddock, striped bass class are still found, and worth-while fields that were by-passed for bigger game in the early days of the industry are being uncovered. But a discouraging number of the new fields, particularly the deep ones, can be likened to the small, freakish fish found, with great difficulty, at the bottom of the sea. More "fishing" in foreign oil fields is being done. Secondary recovery, which is comparable to fish farms, is expanding.

Not so many years ago an eminent authority on the history of invention pointed out that some of the most reliable inventions and forecasts are made by people who have rather limited knowledge of the subject. On that basis, we predict that if petroleum continues to be our principal source of lubricants for at least another half century, the Bradford oil field may very likely be operating when the calendar is turned over to the year 2000.

Additional copies of this issue are available upon request.

CURRENT TRENDS

It was quite clear in August that business in the Third Federal Reserve District was still on the up and up, feeling the impact of rearmament and the Korean War. With summer vacations ended, factory working forces were enlarged and production was stepped up. Department store sales tapered off from the "scare buying" peak reached in July but continued buoyant. Building contractors, anticipating higher costs, shortages of materials, notably cement, and perhaps government controls, rushed to complete construction started or planned for the near future. In response to rising business requirements, the output of both anthracite and bituminous coal was increased as was the volume of bank loans.

Spurred on by the growing backlog of orders, Pennsylvania manufacturers expanded operations in an effort to meet the demand for their products which was given further impetus by the Korean War. The greatest gains in output again occurred in plants making durable goods. Iron and steel plants, which had been running near top capacity for months, managed to increase production, and cement mills are running their machinery ragged to meet demands. In the nondurable field, the apparel and textile mills were scenes of greater activity. To raise production, manufacturers in both major groups hired additional workers and lengthened the work-week. The substantial increase in the number of employees which occurred in the transportation equipment industry was due primarily to a strike settlement. Although hourly earnings advanced only 4 per cent since last August, longer hours raised weekly wages by more than five dollars. As a result of both higher weekly earnings and greater employment, payrolls were again above the levels of a year ago.

Bulging pay envelopes and climbing employment helped to keep the volume of department store sales high after "scare buying" had abated considerably in August. Instalment credit buying increased as the public continued to purchase such items as television sets and refrigerators before Regulation W became effective. In spite of the high level of retail activity, the prices paid by consumers remained unchanged from July to August.

Business and consumer loans continued to spearhead the expansion of loans in weekly reporting banks in the Third District during September. Investments declined for the third consecutive month.

The nation's money supply advanced again in August mainly on the strength of an increase in demand deposits. Member bank reserves declined very slightly during August despite an increase in System holdings of Government securities, but increased in September.

SUMMARY	Third Federal Reserve District			United States		
	Per cent change			Per cent change		
	August 1950 from		8 mos. 1950 from year ago	August 1950 from		8 mos. 1950 from year ago
	mo. ago	year ago	ago	mo. ago	year ago	ago
OUTPUT						
Manufacturing production.....	+ 6*	+15*	- 1*	+ 6	+21	+ 9
Construction contracts.....	+34	+73	+41	- 1	+47	+52
Coal mining.....	+40	+20	+ 1	+32	+30	- 1
EMPLOYMENT AND INCOME						
Factory employment.....	+ 5*	+ 8*	- 3*	+ 5	+10	+ 2
Factory wage income.....	+ 7*	+19*	+ 1*	.....	.....	.....
TRADE**						
Department store sales.....	- 4	+19	+ 5	- 7	+18	+ 5
Department store stocks.....	+ 8	+20	.....	+ 6	+12	.....
BANKING (All member banks)						
Deposits.....	0	+ 6	+ 5	+ 1	+ 5	+ 4
Loans.....	+ 4	+18	+10	+ 3	+16	+ 7
Investments.....	- 1	+ 1	+ 7	0	- 1	+ 7
U. S. Govt. securities.....	- 2	- 2	+ 5	- 1	- 4	+ 6
Other.....	+ 3	+14	+14	+ 4	+20	+19
PRICES						
Wholesale.....	.....	.....	.....	+ 2	+ 9	0
Consumers.....	0†	+ 2†	- 1†	0	+ 2	0
OTHER						
Check payments.....	+ 8	+25	+16	+16	+30	+10
Output of electricity.....	+11	+ 9	+ 7	.....	.....	.....

LOCAL CONDITIONS	Factory*				Department Store				Check Payments	
	Employment		Payrolls		Sales		Stocks			
	Per cent change Aug. 1950 from		Per cent change Aug. 1950 from		Per cent change Aug. 1950 from		Per cent change Aug. 1950 from			
	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago	mo. ago	year ago		
Allentown.....	+ 8	+11	+ 6	+23	.....	.....	.....	+ 7	+23	
Altoona.....	+ 7	+49	+12	+75	.....	.....	.....	+13	+16	
Harrisburg.....	+10	+ 9	+13	+23	.....	.....	.....	+14	+12	
Johnstown.....	+ 6	+ 8	+ 2	+18	.....	.....	.....	+11	+21	
Lancaster.....	+ 3	+ 3	+ 6	+19	- 2	+31	+ 9	+12	+ 1	+16
Philadelphia.....	+ 8	+ 5	+13	+15	+10	+21	+25	+26	+ 9	+29
Reading.....	+ 4	+ 5	+ 7	+18	- 5	+ 9	+ 8	+ 6	+16	+27
Scranton.....	+ 5	+ 9	+ 8	+20	.....	.....	.....	.....	+ 4	+13
Trenton.....	.....	.....	.....	.....	- 4	+22	+ 7	+ 5	- 6	+ 8
Wilkes-Barre.....	+ 5	+ 3	+11	+10	- 9	+11	+11	+16	0	0
Williamsport.....	+ 6	+15	+ 7	+20	.....	.....	.....	.....	+ 8	+24
Wilmington.....	+ 3	+10	+ 2	+13	.....	.....	.....	.....	- 3	+25
York.....	- 2	+10	+ 2	+24	- 3	+17	+16	+19	+ 9	+15

*Pennsylvania—Revised series—not comparable with previous reports.
 **Adjusted for seasonal variation. †Philadelphia.

*Not restricted to corporate limits of cities but covers areas of one or more counties.

MEASURES OF OUTPUT

	Per cent change		
	Aug. 1950 from		8 mos. 1950 from year ago
	month ago	year ago	
MANUFACTURING (Pa.)*	+ 6	+ 15	- 1
Durable goods industries	+ 7	+ 20	- 2
Nondurable goods industries	+ 6	+ 9	+ 1
Foods	+ 8	+ 8	- 2
Tobacco	+ 5	- 5	- 10
Textiles	+ 10	+ 14	+ 5
Apparel	+ 12	+ 11	+ 4
Lumber	+ 5	+ 10	0
Furniture	+ 5	+ 35	+ 31
Paper	0	+ 11	+ 8
Printing and publishing	+ 1	0	- 2
Chemicals	+ 3	+ 11	0
Petroleum and coal products	0	0	- 2
Rubber	- 2	+ 30	+ 12
Leather	+ 4	+ 4	- 1
Stone, clay and glass	+ 6	+ 11	- 1
Primary metal industries	+ 3	+ 29	0
Fabricated metal products	+ 10	+ 22	- 3
Machinery (excl. electrical)	0	+ 17	- 6
Electrical machinery	+ 9	+ 18	+ 3
Transportation equipment	+ 36	+ 1	- 23
Instruments and related products	+ 10	+ 12	- 3
Misc. manufacturing industries	+ 17	+ 18	+ 9
COAL MINING (3rd F. R. Dist.)**	+ 40	+ 20	+ 1
Anthracite	+ 43	+ 18	+ 3
Bituminous	+ 29	+ 37	- 10
CRUDE OIL (3rd F. R. Dist.)†	0	+ 7	- 1
CONSTRUCTION — CONTRACT AWARDS (3rd F. R. Dist.)††	+ 34	+ 73	+ 41
Residential	+ 48	+ 173	+ 88
Nonresidential	+ 35	+ 68	+ 27
Public works and utilities	+ 13	+ 9	+ 10

*Revised series — not comparable with previous reports.

**U.S. Bureau of Mines.

†American Petroleum Inst. Bradford field.

††Source: F. W. Dodge Corporation. Changes computed from 3-month moving averages, centered on 3rd month.

EMPLOYMENT AND INCOME*

Pennsylvania Manufacturing Industries**	Employment		Payrolls		Average Weekly Earnings		Average Hourly Earnings	
	Aug. 1950 (Index)	Per cent change from mo. ago	Aug. 1950 (Index)	Per cent change from mo. ago	Aug. 1950	% chg. from year ago	Aug. 1950	% chg. from year ago
Indexes (1939 avg. = 100)								
All manufacturing	134	+ 5	344	+ 7	\$57.58	+ 10	\$1.43	+ 4
Durable goods industries	154	+ 6	372	+ 7	62.43	+ 10	1.54	+ 3
Nondurable goods industries	115	+ 4	307	+ 7	51.25	+ 9	1.28	+ 4
Foods	128	+ 4	301	+ 7	52.41	+ 8	1.25	+ 5
Tobacco	86	+ 2	213	+ 4	32.70	+ 8	.85	+ 4
Textiles	85	+ 5	243	+ 12	51.17	+ 8	1.26	+ 2
Apparel	139	+ 7	346	+ 12	39.33	+ 13	1.06	+ 6
Lumber	172	+ 1	430	+ 6	43.58	+ 8	1.03	+ 4
Furniture	142	+ 5	394	+ 6	51.03	+ 7	1.19	+ 5
Paper	137	- 1	372	0	58.61	+ 11	1.34	+ 4
Printing and publishing	120	+ 1	292	+ 2	68.95	+ 2	1.77	+ 3
Chemicals	137	+ 3	364	+ 5	63.12	+ 14	1.50	+ 6
Petroleum and coal products	158	+ 1	402	0	76.65	+ 6	1.85	+ 2
Rubber	216	+ 4	550	- 3	63.03	+ 12	1.58	0
Leather	93	+ 3	235	+ 3	43.35	+ 10	1.11	+ 7
Stone, clay and glass	136	+ 4	341	+ 5	57.33	+ 9	1.46	+ 4
Primary metal industries	131	+ 3	315	+ 2	67.28	+ 13	1.71	+ 2
Fabricated metal products	165	+ 5	416	+ 11	59.61	+ 11	1.45	+ 4
Machinery (except electrical)	210	+ 3	515	0	62.13	+ 10	1.48	+ 3
Electrical machinery	236	+ 6	493	+ 8	58.46	+ 1	1.45	- 2
Transportation equipment	140	+ 31	364	+ 42	73.86	+ 16	1.77	+ 6
Instruments and related products	155	+ 6	403	+ 11	59.46	+ 14	1.47	+ 8
Misc. Industries	135	+ 12	336	+ 17	50.96	+ 13	1.19	+ 5

*Revised series — not comparable with previous reports.

**Production workers only.

TRADE

Third F. R. District	Aug. 1950 (Index)	Per cent change	
		Aug. 1950 from	
		month ago	year ago
Indexes: 1935-39 Avg. = 100			
Adjusted for seasonal variation			
SALES			
Department stores	319	- 4	+ 19
Women's apparel stores	241	+ 2	+ 10
Furniture stores		+ 7*	+ 20*
STOCKS			
Department stores	259	+ 8	+ 20
Women's apparel stores	227	+ 8	+ 21
Furniture stores		+ 6*	+ 15*
Recent Changes in Department Store Sales in Central Philadelphia		Per cent change from year ago	
Week ended Sept. 2			0
Week ended Sept. 9			+ 10
Week ended Sept. 16			0
Week ended Sept. 23			+ 12
Week ended Sept. 30			+ 4

*Not adjusted for seasonal variation.

Departmental Sales and Stocks of Independent Department Stores	Sales		Stocks (end of month)	
	% chg. Aug. 1950 from year ago	% chg. 8 mos. 1950 from year ago	% chg. Aug. 1950 from year ago	Ratio to sales (months' supply) August
Third F. R. District				
Total — All departments	+ 18	+ 2	+ 25	3.4 3.2
Main store total	+ 21	+ 4	+ 25	3.5 3.4
Piece goods and household textiles	+ 22	- 1	+ 12	2.8 3.1
Small wares	+ 7	+ 1	+ 26	4.7 4.0
Women's and misses' accessories	+ 14	+ 1	+ 32	4.2 3.6
Women's and misses' apparel	+ 9	- 7	+ 30	2.6 2.2
Men's and boys' wear	+ 16	+ 3	+ 22	5.8 5.5
Housefurnishings	+ 41	+ 17	+ 23	3.0 3.4
Other main store	+ 4	- 1	+ 22	4.1 3.4
Basement store total	+ 6	- 4	+ 25	2.6 2.2
Domestics and blankets	+ 25	+ 8	+ 24	1.9 1.9
Small wares	+ 15	+ 9	+ 27	2.8 2.5
Women's and misses' wear	0	- 9	+ 32	2.1 1.6
Men's and boys' wear	+ 10	0	+ 23	3.3 3.0
Housefurnishings	+ 11	+ 3	+ 29	3.5 3.0
Shoes	+ 6	- 2	+ 8	3.5 3.4
Nonmerchandise total	+ 10	+ 2		

CONSUMER CREDIT

Sale Credit Third F. R. District	Sales		Receiv- ables (end of month)
	% chg. Aug. 1950 from year ago	% chg. 8 mos. 1950 from year ago	% chg. Aug. 1950 from year ago
Department stores			
Cash	+ 6	- 3	.....
Charge account	+25	+ 5	+15
Installment account	+54	+23	+39
Furniture stores			
Cash	+ 3	- 3	.....
Charge account	+48	+14	.....
Installment account	+28	+12	+24
Loan Credit Third F. R. District	Loans made		Loan bal- ances out- standing (end of month)
	% chg. Aug. 1950 from year ago	% chg. 8 mos. 1950 from year ago	% chg. Aug. 1950 from year ago
Consumer installment loans			
Commercial banks	+59	+62	+14
Industrial banks and loan companies	+28	+ 8	+12
Small loan companies	-35	-37	+13
Credit unions	+30	+31	+35

PRICES

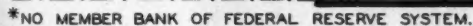
Index: 1935-39 average =100	Aug. 1950 (Index)	Per cent change from	
		month ago	year ago
Wholesale prices—United States	206	+2	+9
Farm products	234	+1	+9
Foods	221	+2	+9
Other	191	+3	+7
Consumer prices			
United States	173	0	+2
Philadelphia	172	0	+2
Food	206	0	+4
Clothing	182	0	-1
Rent	122	0	+1
Fuel	145	+2	+2
Housefurnishings	196	+2	+2
Other	154	+1	+1


Weekly Wholesale Prices—U.S. (Index: 1935-39 average =100)	All com- modities	Farm products	Foods	Other
Week ended September 5	208	236	224	193
Week ended September 12	210	239	226	194
Week ended September 19	211	239	226	196
Week ended September 26	210	237	224	196


Source: U.S. Bureau of Labor Statistics.

BANKING

MONEY SUPPLY AND RELATED ITEMS United States (Billions \$)	Aug. 30 1950	Changes in—	
		five weeks	year
Money supply, privately owned	171.1	+ .7	+ 4.3
Demand deposits, adjusted	87.5	+ .9	+ 4.2
Time deposits	59.1	+ .3	+ .7
Currency outside banks	24.5	+ .1	— .6
Turnover of demand deposits	21.8*	+5.3*	+16.0*
Commercial bank earning assets	123.5	+1.0	+ 5.5
Loans	47.3	+1.3	+ 6.1
U.S. Government securities	64.4	— .7	— 2.4
Other securities	11.8	+ .4	+ 1.3
Member bank reserves held	16.3	— .1	— .2
Required reserves (estimated)	15.8	+ .2	+ .5
Excess reserves (estimated)	.5	— .3	— .7
Changes in reserves during 5 weeks ended August 30 reflected the following:			
		Effect on reserves	
Decrease in Reserve Bank loans		— .2	
Gold and foreign transactions		— .2	
Net payments to the Treasury		— .2	
Increase of currency in circulation		— .1	
Increase in Reserve Bank holdings of Governments		+ .6	
Change in reserves		— .1	
*Annual rate for the month and per cent changes from month and year ago at leading cities outside N. Y. City.			
OTHER BANKING DATA	Sept. 27 1950	Changes in—	
		four weeks	year
Weekly reporting banks—leading cities United States (billions \$):			
Loans—			
Commercial, industrial and agricultural	15.7	+1.0	+ 2.4
Security	2.2	0	— .1
Real estate	5.1	+ .1	+ .8
To banks	.3	0	+ .1
All other	5.6	+ .1	+ 1.4
Total loans—gross	28.9	+1.2	+ 4.6
Investments	40.3	— 1.1	— 1.8
Deposits	77.2	+ .3	+ 2.8
Third Federal Reserve District (millions \$):			
Loans—			
Commercial, industrial and agricultural	590	+ 33	+112
Security	50	+ 2	+ 20
Real estate	132	+ 4	+ 35
To banks	12	+ 6	— 2
All other	372	+14	+ 79
Total loans—gross	1,156	+ 59	+244
Investments	1,722	— 17	— 71
Deposits	3,163	+ 65	+183
Member bank reserves and related items United States (billions \$):			
Member bank reserves held	16.7	+ .4	+ .7
Reserve Bank holdings of Governments	19.4	+ .8	+ 1.5
Gold stock	23.5	— .3	— 1.1
Money in circulation	27.1	0	— .3
Treasury deposits at Reserve Banks	1.1	+ .5	0
Federal Reserve Bank of Phila. (millions \$)			
Loans and securities	1,289	+ 49	+ 64
Federal Reserve notes	1,697	+ 6	+ 14
Member bank reserve deposits	773	+10	+ 29
Gold certificate reserves	1,234	— 44	— 27
Reserve ratio (%)	49.1%	— 1.9%	— 1.9%

THIRD FEDERAL RESERVE DISTRICT

25% OR LESS ... 

25.1% TO 35% ... 

OVER 35%..... 